

In the west coast, Surati breed of goats noted for its high yield of milk is found. These have been imported from the Bombay Presidency. Bucks of this breed have also been imported into parts of Coimbatore and other districts and crossed with the local breeds with great success in improving the quantity of milk given by the local breeds.

(f) Economic importance of the indigenous breeds.

Name of breed.	Noted for	Where found.
1. <i>Pedda meka.</i>	Meat.	Vizagapatam, E. Godavari, W. Godavari, Kistna, Nellore, Guntur, Bellary, Anantapur, Cuddapah, Kurnool, and parts of Chittoor district.
2. <i>Kaunchi meka.</i>	Milk. ( $\frac{1}{8}$ to $\frac{3}{4}$ Madras measure ( $\frac{1}{2}$ to 3 lb) per day.)	Do.
3. <i>Vella adu.</i>	Dual purpose—meat and milk.)	Parts of Chittoor district, N. Arcot, S. Arcot Chingleput, Tanjore, and Trichinopoly districts.
	Meat.	Madura, Ramnad, Tinnevely, Salem and Coimbatore districts.
4. <i>Vella adu</i>	Dual purpose.	Tanjore and Trichinopoly districts
	Meat.	Parts of Chittoor, district, S. Arcot, N. Arcot and Chingleput districts.
	Milk. ( $\frac{1}{8}$ to $\frac{3}{4}$ Madras measure per day)	Madura, Ramnad, Tinnevely, Salem and Coimbatore districts.
5. <i>Kodi adu.</i>	Meat.	Tanjore district.

Surati goats found in Malabar and S. Kanara districts yield to 1 to 1½ Madras measures (4 to 6 lb) per day.

The writer acknowledges with thanks the information furnished by all the Demonstrators in the Presidency.

## THE EFFECT OF NAPHTHALENE ON GERMINATION OF PADDY SEED

By C. RAJASEKHARA MUDALIAR, M. A.,  
*Assistant to the Paddy Specialist.*

It is a common practice in breeding stations to store the large number of single plant selections and various type collections in tin-screw-top bottles and preserve them against the attack of paddy moths with a ball of naphthalene. This practice, however, did not seriously affect the vitality of paddy seeds as was observed in our sowing operations. Seeds preserved in naphthalene appeared for all practical purposes to germinate and grow normally. To get more accurate and definite results, a series of experiments were carried out at the Agricultural Research Station, Aduturai, to determine the effect of

naphthalene on a number of paddy varieties in dry and moist conditions. The investigations consisted of determining the effect of naphthalene (1) on dry paddy seeds, and (2) on seeds soaked in water and on those saturated with atmospheric moisture.

Rangaswami Iyengar and Vijayaraghavan (1926)\* have investigated the effect of naphthalene on dry millet seeds and come to the conclusion that dry seeds preserved in bottles are not affected by any amount of naphthalene added to them. Similar experiments conducted with the Coimbatore paddy varieties at Coimbatore some years ago, also revealed that naphthalene had no effect on paddy seeds in the dry condition up to two years.

**The action of naphthalene on dry paddy seeds.** The experiments consisted of two series. In one, varying quantities of naphthalene powder were added to the same quantity of dry paddy seed contained in 4 oz. bottles with screw-tops. In the other, definite quantities of six important Aduturai varieties were packed in small gunny bags along with fixed quantities of naphthalene powder. This series was included to simulate the ryots' condition of storage. The main difference between the two is that in the former the seed is not subject to the play of atmosphere, whereas in the latter the seed is subject to the influence of atmospheric moisture.

(i) *Subjecting dry seeds to varying quantities of naphthalene.* Three Aduturai strains, Adt. 2, 3, and 4 and a scented variety, *Jeeraga sanna bhatta* (AEB, 178) were selected for this experiment. Definite quantities (65 grams) of well dried seeds were taken in each variety. The quantities of commercial naphthalene used were 1, 2, 3, 4 and 6 grams. Naphthalene was used in powdered form, so that it may volatilize sooner than the balls. The naphthalene powder was placed at the bottom of the 4 oz. bottles and the seeds were prevented from actually coming into contact with naphthalene by placing a blotting paper between the two. This precaution was taken to reduce to a minimum, the bad effects, if any, of the naphthalene coming in direct contact with the seed. In each variety there was a control without any naphthalene.

Germination trials were conducted once a month for each variety and the trials on each occasion were carried up to the 7th day to ensure maximum germination.

The results of the germination tests of two varieties Adt. 2 and Adt. 3 only are given in Tables I and II, the results of Adt. 4 and AEB. 178 being not different. To avoid too many entries in the table only two stages of germination are given in each month's trial, namely, the percentage germination on the third day after starting the test and the total germination. It may be noted that the total germination

\* The Madras Agricultural Department, Year Book—1925.

was not affected to any appreciable extent in all the varieties during the period of treatment, but a definite fall is noticed in the rate of germination on the third day, after a particular period for each variety. In all the varieties tried, the varying quantities of naphthalene seem to have no effect on the ultimate germinating capacity when the dry seed was tested. In the case of AEB. 178 it was noted that the vitality of the control was much higher than the treated samples when the rate of germination up to the third day was taken into account.

The low rate of germination on the third day in the first two months of trial (January and February) in the case of Adt. Nos. 3 and 4 and in the fifth month (May) of trial in the case of Adt. 2 is not explicable. As the germination trays were placed in a wooden box and not in an incubator, it is possible that a uniform temperature was not obtained, and the changing weather conditions have had a fairly large play upon the rate of germination; thus the cold weather in the months of January and February might have brought about a decrease in the rate of germination. The fall in germination in the months of October, November, and December in the different varieties may also be due to cold weather, in addition to the loss in viability resulting from long storage.

(ii) *The effect of naphthalene on paddy stored in gunny bags.* Definite quantities,  $2\frac{1}{2}$  lb., of the strains Aduturai Nos. 1, 2, 3, 4 and 5 and AEB. 65 (Nellore samba small grained) were stored in small gunny bags, along with 6 grammes of powdered naphthalene packed in blotting papers and placed inside each bag. There was also a control bag in each case without naphthalene. The results of the monthly germination trials are given in Tables III and IV.

During the ten months' trial, the high percentage of total germination is kept up both in the control and in the treated seed up to the ninth month, while the rate of germination on the third day has perceptibly fallen after the seventh month of storage. Aduturai strains Nos. 3 and 4, however, indicated high percentage of germination even after the ninth month.

It appears that germination is more rapidly affected when paddy varieties are stored in gunnies with naphthalene than when stored in bottles. This is probably due to the fact that the seeds in the former are exposed to the atmospheric moisture which appears to increase the harmful effect of naphthalene.

**The action of naphthalene on moist paddy seeds.** Naphthalene balls ordinarily used as a preservative for seeds in bottles are generally taken out of the bottles before the seeds are soaked in water, but it sometimes happens that by oversight the balls are left in the bottles themselves. It was therefore decided to test the effect of naphthalene in soaked seed.

(i) *Germination trials with paddy seeds soaked in water with naphthalene.* Two samples in each of Adt. Nos. 1, 2, and 3 were soaked in separate bottles and to one, powdered naphthalene was added, at the rate of 2 grammes for each bottle leaving the other as control. Naphthalene was allowed to act upon the seeds for 24 hours, the usual period for soaking paddy seeds, and the germination trials were carried on for all the six units after removing them from the influence of naphthalene. It was observed that the total germination on the third day was not affected by soaking seeds with naphthalene for one full day.

(ii) *Subjecting germinating paddy seeds to the continued influence of naphthalene vapour.* In this experiment germinating seeds of Adt. 1 were subjected to the action of naphthalene vapour, by placing powdered naphthalene in the bottom tray of the ordinary germination apparatus, taking care not to spill the powder over the upper tray. The germination was observed to be 95%. It was observed that the tender radicles grew to a length of 0.1 of an inch and then stopped growth; similarly the plumules also grew to a length of 0.1 of an inch and eventually both of them showed signs of death, whereas in the control where there was no naphthalene the growth, both of the radicle and the plumule was normal.

It is therefore clear that some of the volatile substances escaping from naphthalene must have retarded the growth of the embryo,

(iii) *Influence of naphthalene on paddy seeds saturated with water vapour.* Then the action of naphthalene on paddy varieties saturated with water vapour was sought to be determined. No doubt the latter state of things may be a little abnormal and may not be obtained even in the case of storage in gunny bags which are exposed to the atmosphere, but this may certainly throw some light on the retarding effect of naphthalene on the paddy seeds saturated with moisture.

Two varieties of paddy, Adt. 2 and Adt. 4 were each placed inside two bell jars in one of which there was a tray of water to saturate the atmosphere inside the jar with moisture and in the other naphthalene powder was placed in addition to the tray of water. The seeds were taken each week and tested for germination and the results are given in Tables V and VI. It may be observed from the tables that the results of the trials with Adt. 2 and Adt. 4 (naphthalene treatment) the viability is kept up until the fourth week in the case of Adt. 4, and in the case of Adt. 2 there was a distinct fall in viability even on the third week after starting the experiment. In the case of Adt. 2 it was also observed that the germination began to be affected by the fourth week and it was almost completely destroyed after a period of  $2\frac{1}{2}$  months. The controls in all these cases also lose their germination capacities by storage in moisture-laden atmosphere for a long time, but not to such an extent as under the additional influence of naphthalene.

**Summary of results.** (1) Varying quantities of naphthalene did not affect the germinating capacity of dry seeds of Aduturai Nos. 2, 3 and 4 for a period of one year, after which period indications of deterioration in the vitality of seeds were visible, while in the case of *Jeeraga sanna bhitta*, (AEB. 178) a scented variety, the fall in vitality was brought about much earlier, about six months, by naphthalene treatment.

(ii) Paddy varieties stored in gunny bags along with naphthalene are not affected for a period of seven months, after which period the germination becomes prolonged.

(iii) Naphthalene left with the seeds soaked in water before sowing did not injure the growing embryo, but if the seeds are subjected to the influence of naphthalene vapour after the germination had started, the tender radicle and plumule are injured and finally signs of death are noticed.

(iv) The combined action of naphthalene vapour and the saturated atmosphere seriously affect the viability of paddy seeds within a much shorter period than when they are left under the influence of saturated atmospheric moisture alone.

Table I

Germination trials with Adt. 2. (White Sirumani) dry seed with different quantities of naphthalene

Treatment.	3rd month of trial	4th month of trial	5th month of trial	6th month of trial	7th month of trial	8th month of trial	9th month of trial	10th month of trial	11th month of trial	12th month of trial	13th month of trial	14th month of trial	15th month of trial
	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination	Germination on third day Total germination
Control	78 98	94 97	84 100	97 99	96 97	96 96	95 99	100 100	95 97	96 97	94 98	90 98	84 96
1. Gr. naphthalene	86 97	92 100	70 98	99 99	91 99	93 97	94 98	92 95	96 97	92 96	89 97	66 98	65 91
2. "	93 99	92 98	65 98	97 99	94 95	88 98	96 99	87 96	92 94	89 97	88 99	73 98	62 88
3. "	93 100	91 99	70 97	97 99	93 96	95 100	95 98	95 98	94 97	94 98	95 100	74 95	75 93
4. "	91 99	93 100	75 97	100 100	95 99	97 97	96 99	92 97	81 95	94 97	80 94	62 95	60 90
6. "	87 100	99 100	80 100	99 99	92 97	97 97	94 96	94 97	92 94	96 97	89 94	73 96	70 90

Table II.

Germination trials with *Adt. 3* (early *Kurivai*) dry seed with different quantities of naphthalene.

Treatment.	4th month of trial.		5th month of trial.		6th month of trial.		7th month of trial.		8th month of trial.		9th month of trial.		10th month of trial.		11th month of trial.		12th month of trial.		13th month of trial.		14th month of trial.		
	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	
Control.	50	99	70	99	98	100	98	99	86	96	100	100	89	100	87	100	98	100	98	60	98	67	100
1 gm. naphthalene	42	99	60	99	96	99	93	97	90	100	94	98	89	99	70	99	85	99	60	98	67	100	
2 "	36	100	70	99	94	99	93	100	99	100	94	98	90	98	64	98	81	100	66	100	55	98	
3 "	50	100	60	99	92	98	93	99	84	89	86	95	86	100	70	96	83	98	45	97	54	100	
4 "	45	100	64	97	96	98	94	100	89	99	87	95	87	98	66	98	88	100	52	99	50	99	
6 "	45	96	67	99	87	98	93	99	92	95	88	91	88	98	61	98	83	99	50	100	53	98	

Table III

Germination trials with the varieties Adt. 1, 2, 3, 4, 5, and AEB 65 preserved in gunny bags without naphthalene.

Varieties.	2nd month of trial		3rd month of trial		4th month of trial		5th month of trial		6th month of trial		7th month of trial		8th month of trial		10th month of trial	
	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination
Adt. 1 Control	96	99	100	100	96	98	95	98	100	100	90	95	70	91	20	76
" 2 "	94	98	96	100	99	100	98	99	99	99	99	99	91	97	8	65
" 3 "	96	99	98	100	96	100	97	100	96	98	97	100	51	99	9	92
" 4 "	96	100	98	99	99	100	98	100	99	100	99	99	80	98	12	81
" 5 "	97	98	97	100	98	99	99	100	99	99	98	100	80	91	13	56
AEB 65 "	93	96	100	100	96	99	95	99	94	95	98	99	72	87	6	33

Table IV.

Germination trials with the varieties Adt. 1, 2, 3, 4, 5 and AEB 65 preserved in gunny bags with naphthalene:

Varieties.	2nd month of trial		3rd month of trial		4th month of trial		5th month of trial		6th month of trial		7th month of trial		8th month of trial		10th month of trial	
	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination
Adt. 1 Naphthalene	95	98	97	97	96	97	99	99	98	99	96	98	77	97	6	87
" 2 "	95	98	100	100	93	99	97	99	98	99	97	99	80	95	3	56
" 3 "	94	100	98	99	98	99	100	100	98	99	86	100	50	99	4	92
" 4 "	96	100	98	98	100	100	98	100	99	100	97	98	83	100	9	81
" 5 "	98	100	96	99	96	98	97	99	100	100	96	98	89	98	3	36
AEB 65 "	97	99	96	99	98	99	96	98	99	99	100	100	70	82	2	12



Table V

Germination trials with Adt. 1 preserved in a saturated moist chamber.

Period of testing.	Adt. 1 (control).					Adt. 1 (naphthalene treated)				
	3rd day of trial	4th day of trial	5th day of trial	6th day of trial	Total Germination	3rd day of trial	4th day of trial	5th day of trial	6th day of trial	Total Germination
3rd week	94	5	1	..	100	16	39	26	2	83
4th "	91	5	2	..	98	..	3	10	20	33
5th "	97	1	..	..	98	..	2	5	3	10
6th "	92	2	1	1	96	..	..	..	..	..

Table VI

Germination trials with Adt. 4 preserved in a saturated moist chamber.

Period of testing.	Adt. 4 (control).					Adt. 4 (Naphthalene treated).						
	3rd day of trial.	4th day of trial.	5th day of trial.	6th day of trial.	Total Germination.	3rd day of trial.	4th day of trial.	5th day of trial.	6th day of trial.	7th day of trial.	8th day of trial.	Total Germination.
1st week.	99	..	..	..	99	97	2	..	..	..	..	99
2nd "	99	1	..	..	100	99	..	..	..	..	..	99
3rd "	95	4	1	..	100	45	48	1	1	..	..	95
4th "	100	..	..	..	100	8	47	24	..	9	..	88
5th "	99	1	..	..	100	..	..	11	8	13	4	36
6th "	95	4	..	..	99	..	..	..	1	2	6	9
7th "	86	10	1	..	97	..	..	..	..	..	..	..

## SOME SOUTH INDIAN VILLAGE STUDIES \*

(A Preparatory Study of "Villur" Village No. 119, in Tirumangalam Taluk, Madura District, Madras Province).

BY P. S. SESHADRI

### Animals.

(a) *Bullocks.* In the whole district, the average area tilled by a pair of bullocks is largest in Tirumangalam taluq. The indigenous cattle of the district being small sized, bullocks are generally bought at high prices at Madura and other places. In Villur, on account of the precarious rainfall, the produce obtained does not justify the maintenance of costly bullocks and the people are too poor to afford the initial cost. Only a few cultivators go in for these, while the others have to remain content with the inefficient locally bred animals. Naturally they are overworked and worked at too early an age.

\* Continued from page 188, May issue.